

REMARKS

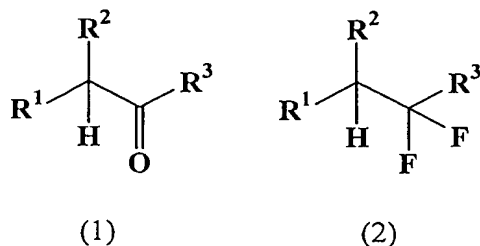
The rejection of Claims 1-15 under 35 U.S.C. § 103(a) as unpatentable over U.S. 4,792,618 (Bieron et al) taken with WO 96/03357 (Chambers et al), is respectfully traversed.

The present invention relates to a process for effectively producing a fluorine-containing compound having such a structure that two fluorine atoms are bonded to one carbon atom ( $-\text{CF}_2$ ), i.e. a geminal difluoro structure. The fluorine-containing compound of the formula (2) of the present invention is a compound useful as e.g. perfume, pharmaceuticals, agricultural chemicals and chemical agents.

As described in the specification under "Background Art," beginning at page 1, line 12, a method for introducing a fluorine atom bonded to a carbon atom into a compound is known wherein a fluorinating agent which generates fluorine anions enters into a nucleophilic substitution reaction with a corresponding compound containing a chlorine atom wherein the fluorine replaces the chlorine. As a method for obtaining a fluorine-containing compound having a geminal difluoro structure by means of said method, a method of fluorinating a compound having a geminal dichloro structure at the corresponding part may be mentioned. However, it is difficult to selectively obtain a desired compound having such a geminal dichloro structure, particularly when a ketone part of a compound having a C-H structure at the  $\alpha$ -position of a ketone is converted to a geminal dichloro structure, a reaction such as elimination of HCl takes place, whereby at least two types of compounds are formed, and it tends to be difficult to obtain an intended compound with a high yield, such being problematic. Accordingly, a method of converting a ketone to a geminal dichloro structure, followed by fluorination, has not been carried out. Other methods are also known in the prior art as described therein. In addition, Applicants note in the specification beginning at page 3, line 11, that a means to fluorinate a chloroolefin obtained by a Diels-Alder reaction with HF has been reported by Bieron et al. As Applicants further describe, compounds to which

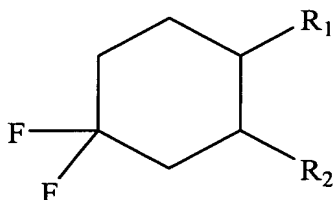
Bieron et al's method can be applied are limited in structure. Further, in many cases, isomers which are difficult to be separated and purified form as by-products, such being disadvantageous as a method for obtaining a geminal difluoro compound with a high purity.

The present invention is directed to overcoming the above-discussed problems of the prior art. As recited in above-amended Claim 1, the invention is a process for producing a fluorine-containing compound of the following formula (2), which comprises reacting a compound of the following formula (1) with a compound of the formula X-Z or a compound of the formula Z<sub>2</sub>O (wherein Z is a monovalent group which gives a leaving group of the structure -OZ, and X is a chlorine atom, a bromine atom or an iodine atom), and then further reacting with a fluorinating agent which generates fluorine anions thereon to obtain the fluorine-containing compound of the following formula (2):

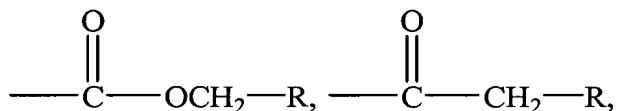


wherein each of R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> which are independent of one another, is a hydrogen atom, a fluorine atom or a monovalent organic group, or two selected from R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> together form a bivalent organic group, and the other one is a hydrogen atom, a fluorine atom or a monovalent organic group.

In addition to the discussion of Bieron et al above, Bieron et al discloses the use of chlorocyclohexenyl compounds as starting reactants to form a gem-dihalo-cyclohexane compound intermediate which may have the following formula:



wherein R<sub>1</sub> and R<sub>2</sub> are independently selected from the group consisting of -H, -CH<sub>2</sub>-OH, -COF, -COC1, -CF<sub>3</sub>, -CN,



and -CH<sub>2</sub>R, where R is -H or alkyl of 1-4 carbon atoms, (column 4, line 10, combined with column 2, line 66 through column 3, line 7). However, Bieron et al neither discloses nor suggests a compound of present formula (1), let alone reacting of this compound with a compound of present formula X-Z or a compound of present formula Z<sub>2</sub>O. The Examiner thus relies on Chambers et al. Chambers et al discloses a process for the preparation of a selectively fluorinated organic compound, which process includes the reaction of a precursor of the organic compound, the precursor containing at least one group VI element selected from sulfur, selenium and tellurium, with a fluorinating agent and another halogenating agent, wherein the fluorinating agent is elemental fluorine (page 2, third full paragraph). As a particular embodiment therein, and as apparently relied on by the Examiner, Chambers et al

discloses production of difluorinated compounds of formulae (13) or (14), obtained by converting corresponding thiocarbonyl compounds of formulae (15) or (16) by reaction with elemental fluorine and another halogenating agent (paragraph bridging pages 6 and 7).

The Examiner finds that it would have been obvious to substitute the sulfur in Chambers et al with oxygen, and to employ this modified version of Chambers et al to modify Bieron et al.

In reply, since Chambers et al is specifically limited to a group VI element selected from the group consisting of sulfur, selenium and tellurium, one skilled in the art would clearly not select oxygen therein. Indeed, in view of the notoriety of oxygen as a group VI element, Chambers et al's omission from their group VI element component was clearly intentional. Nevertheless, even if one skilled in the art were to substitute oxygen for sulfur in Chambers et al, the combination of Chambers et al so modified with Bieron et al would still not result in the presently-claimed invention. The process of Chambers et al is a one-step process, wherein their thiocarbonyl compound is converted directly to their difluorinated analogs. Bieron et al, on the other hand, employs a chloro-cyclohexenyl compound as a starting material. Thus, each of Bieron et al and Chambers et al are separate, independent processes. It is not clear how they could be combined. Moreover, neither process discloses or suggests the reaction of a carbonyl compound, or even a thiocarbonyl compound, with a compound of present formula X-Z or Z<sub>2</sub>O.

For all the above reasons, it is respectfully requested that the rejection over Bieron et al taken with Chambers et al, be withdrawn.

The rejection of Claims 1-15 under 35 U.S.C. § 112, first paragraph, as not being enabled for organic group containing compounds other than difluorocyclohexane-carboxylic acid, is respectfully traversed. The Examiner holds that there is insufficient disclosure of starting materials that would place "such a diverse genus of compounds in possession of the

public in the event of a patent grant." The Examiner further finds that there is "no reasonable assurance that such an alleged genus of compounds would possess all of the alleged properties for use" and that "more than routine experimentation would be required to place the claimed compounds, compositions and methods of use in possession of the public in the event of a patent grant." (Citations omitted.)

In reply, it is clear from the disclosure as filed that Applicants do not intend any limitations on the compound of formula (1) beyond the disclosures of applicable R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> groups.

A specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the enablement requirement of 35 U.S.C. §112, first paragraph, unless there is a reason to doubt the objective truth of the statement contained therein which must be relied on for enabling support. The first paragraph of 35 U.S.C. §112 requires nothing more than objective enablement. See *In re Marzocchi*, 169 USPQ 367 (CCPA 1971) (**copy enclosed**), and M.P.E.P. 2164.04. The Examiner has set forth **no** reasons why one skilled in the art would doubt the truth of any statement in Applicants' disclosure.

In the absence of prior art, it is manifestly unjust to require such limiting of the claims, since it would invite any would-be pirate to use a ketone starting material not specifically disclosed and thereby infringe the claims with impunity. Such a requirement is also contrary to law. *Marzocchi, supra*. The Examiner has not met his burden in showing why objective enablement is not present.

In addition, it is not clear why the Examiner included Claims 4, 9 and 14 in the rejection, since these claims are limited to difluorocyclohexane-carboxylic acid derivatives.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

The rejection of Claims 1-15 under 35 U.S.C. § 112, first paragraph, as failing to provide enablement for a method for making heterocyclic group containing compounds, *per se*, is respectfully traversed. To the extent this rejection is directed to the starting compound of formula (1), what has been stated above with regard to the other rejection under 35 U.S.C. § 112, first paragraph, applies herein as well. To the extent this rejection also applies to the final product of formula (2), note additionally that the reaction which takes place in the presently-claimed process involves the replacement of a keto oxygen to form a compound having a geminal difluoro group. Whether the groups R<sup>1</sup>, R<sup>2</sup> and/or R<sup>3</sup> form a heterocyclic group is irrelevant, since R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> are not changed during the reaction. Accordingly, it is respectfully requested that this rejection be withdrawn.

Regarding the Examiner's requirement that the term "acting" be corrected or clarified, it is moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that it be withdrawn.

Applicants note the Examiner's finding that the Information Disclosure Statement (IDS) filed July 30, 2003, does not contain a Form PTO-1449. In reply, Applicants' records indicate that such a Form was included with the IDS. Nevertheless, **submitted herewith** is another copy of the Form. The Examiner is respectfully requested to initial the Form, and include a copy thereof with the next Office communication.

Moreover, since the date of the IDS is before the date of the Office Action and thus technically was part of the Official file as of the Office Action date, Applicants respectfully request that should the Examiner determine that a new ground of rejection needs to be made in the next Office Action relying in whole or in part on any of the references cited in the IDS, then said next Office Action not be made Final, even if the new rejection was necessitated by the present amendment to the claims.

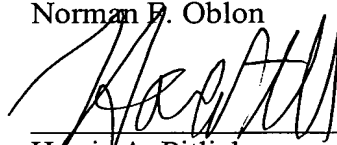
Application No. 10/629,710  
Reply to Office Action of March 9, 2004

All of the presently pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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